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Claims

[c1] A method of reacting a reagent through a plate having a set of vertical apertures for the passage of at least one substance from a first location to a second location, comprising the steps of:
providing a plate having a set of vertical apertures arranged in a array of sample cells;
introducing a first reagent in one of said vertical apertures and reacting said first reagent with a second reagent.

[c2] A method according to claim 1, in which each sample cell contains at least two vertical apertures connected by a horizontal aperture.

[c3] A method according to claim 1, in which at least one of said sets of vertical apertures contains removable liners, further comprising removing at least one removable liner and processing material adhering to said removable liners away from said plate.

[c4] A method according to claim 3, in which at least one of said removable liners is a carrier for a reagent, whereby in operation said reagent reacts with a substance in an

applied fluid.

[c5] A method according to claim 1, in which at least one of said sets of vertical apertures is connected to a space for storing rinsing fluid and further comprising as step of rinsing a substance adhering to a surface of an aperture after a reaction step.

[c6] A method according to claim 5, in which said space for storing rinsing fluid is connected by differential capillary means that permits passage of said rinsing fluid and blocks passage of said reagent.

[c7] A method according to claim 1, in which a bottom member is removably attached to said structure, whereby a material adhering to said connecting horizontal aperture may be processed away from said plate.

[c8] A method according to claim 7, in which at least one of said materials adhering to said set of connecting horizontal apertures is a carrier for a reagent, whereby in operation said reagent reacts with a substance in an applied fluid.

[c9] A method according to claim 1, in which said vertical apertures and a reaction region of structures of apertures are adapted such that bubbles rise to a region outside said reaction region.

[c10] A method for reagent delivery to a surface of a microchannel comprising the steps of:
a) bringing the reagent into close proximity with the surface by inserting the reagent in a microstructure whose height is a reduced multiple of the reagent's diffusion constant;
b) reacting the reagent with the desired surface for a reaction time; and
replenishing the microchannel with new reagent when the concentration of reagent near the surface is reduced below a threshold value.

[c11] A method according to claim 10, where the introduction of new reagent is performed in one of a continuous process and a quantized process.

[c12] A method according to claim 10, further including a step of depositing lines or spots on a substrate.

[c13] A method of reacting a reagent through a plate for the passage through a set of apertures of at least one substance from a first location to a second location comprising the steps of:
providing a plate having a set of vertical apertures arranged in a array of sample cells;
introducing a first reagent in one of said vertical aper-

tures and holding a trailing end of said first reagent at a capillary retention valve.

[c14] A method according to claim 13, further comprising: introducing a second reagent and reacting said first reagent with said second reagent.

[c15] A method according to claim 14, further comprising: introducing said second reagent to said first reagent by means of differential capillary attraction attracting said second reagent toward said first reagent.

[c16] A sample-holding plate according to claim 14, in which said first and second reagents are positioned such that a measurable portion of one of said first and second reagents is within a diffusion length of the other of said first and second reagents.

[c17] A sample-holding plate according to claim 15, in which said first and second reagents are positioned such that a measurable portion of one of said first and second reagents is within a diffusion length of the other of said first and second reagents.

[c18] A method for the delivery of non-homogeneous materials in a fluid to a surface in a microfluidic apparatus comprising the steps of:
delivering a fluid containing non-homogeneous materi-

als to a specified position in a microfluidic apparatus; and

using an external force to enable the interaction of the non-homogeneous materials with a surface wall of the microfluidic apparatus.

[c19] A method according to claim 18, where the external force is selected from the group comprising gravity, electrophoretic force or electroosmotic force.

[c20] A method according to claim 18, where the non-homogeneous materials are selected from the group comprising microparticles, microbeads, nanoparticles or biological cells.

[c21] A method of reacting a reagent through a plate for the passage through a set of apertures of at least one substance from a first location to a second location comprising the steps of:

providing a plate having a set of vertical apertures arranged in a array of sample cells;

introducing a first reagent in one of said vertical apertures and holding a trailing end of said first reagent at a capillary retention valve; and

after a period of time, reacting said first reagent with a second reagent.

[c22] A method according to claim 21, in which at least one of said sets of vertical apertures is connected to a space for storing rinsing fluid and further comprising a step of rinsing a substance adhering to a surface of an aperture after a reaction step.

[c23] A method according to claim 21, in which a bottom member is removably attached to said structure, whereby a material adhering to said connecting horizontal aperture may be processed away from said plate.

[c24] A method of metering the delivery of reagents into a microfluidic component comprising the steps of:
interacting a fluid reservoir with the fluid input of a microfluidic component;
controlling the flow into the device using flow restriction elements in the microfluidic component; and
timing the duration of interaction such that the desired amount of fluid is delivered into the microfluidic component.

[c25] A method according to claim 24, where the fluid is driven by capillary action.

[c26] A method according to claim 24, where the fluid in the microfluidic component self-positions itself relative to a capillary retention valve.